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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/396,715	09/15/1999	YOUDONG TONG	5619-NEEC	7845

26689 7590 12/30/2003

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EXAMINER	
ARNOLD JR, JAMES	

ART UNIT	PAPER NUMBER
1764	29

DATE MAILED: 12/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/396,715	TONG, YOUDONG6	
	Examin r	Art Unit	
	James Arnold, Jr.	1764	

-- The MAILING DATE of this communication appears on th cov r sh et with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 1999*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 1999* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 18 July 2003 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaplan et al. (USPN 5,632,865) in view of Stein (USPN 4,842,716).

The Kaplan reference discloses a method of inhibiting fouling (which includes coke formation) of heat transfer surfaces using a phosphorous sulfur compound including phosphite

esters, thiophosphite esters, phosphate esters, thiophosphate esters and mixtures thereof. See Abstract and Column 1, lines 1-35. The Kaplan reference discloses treating a petroleum feedstock (which enters into an ethylene cracking furnace) with at least 10 ppm of a phosphorus-sulfur compound. See Column 5, lines 55-63 and Column 6, lines 1-10. The reference discloses contacting the phosphorous-sulfur compound with steam and nitrogen, which is an inert gas. See Column 4, lines 9-21 and Column 4, lines 45-50.

The reference does not disclose heating a phosphorous-sulfur compound to yield a heat-treated phosphorous sulfur compound exhibiting a ^{31}P NMR peak between about 93 and 97 ppm and contacting the heat transfer surfaces with the heat-treated phosphorous-sulfur compound. The reference does not disclose heating the phosphorous-sulfur compound at a temperature of from about 160 C to 500 C for about 5 minutes to about 3 hours to yield a heat-treated phosphorous-sulfur compound and introducing the heat-treated phosphorous-sulfur compound into the pyrolysis furnace coil. The reference does not disclose a method wherein the phosphorous-sulfur compound is heated in an oxygen and water-free atmosphere. The reference does not disclose a method wherein heat-treated phosphorous-sulfur compound is injected into the pyrolysis furnace from about 20 minutes to about 24 hours prior to processing the hydrocarbon feedstock nor a method wherein heat-treated phosphorous-sulfur compounds are injected into the pyrolysis furnace simultaneously with hydrocarbon feedstock. The reference does not disclose a method wherein the carrier is a natural gas.

The Stein reference discloses introducing a heated, aggressive liquid additive into a vapor-containing process stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Kaplan to include Stein's heated, aggressive liquid additive because Kaplan discloses that antifoulants themselves may pose corrosion threats and this threat is eliminated by thermal treatment. It would have been obvious to one having ordinary skill in the art at the time the invention was made to heat a phosphorous-sulfur compound to yield a heat-treated phosphorous-sulfur compound exhibiting a ^{31}P NMR peak between about 93 and 97 ppm and contacting the heat transfer surfaces with the heat-treated phosphorous-sulfur compound because the changes in NMR resonance would naturally occur with thermal treatment and it would be appropriate to heat the phosphorous-sulfur compound to any degree necessary for effective fouling inhibition. It would have been obvious to one having ordinary skill in the art at the time the invention was made to heat the phosphorous-sulfur compound at a temperature of from about 160 C to 500 C for about 5 minutes to about 3 hours to yield a heat-treated phosphorous-sulfur compound and introducing the heat-treated phosphorous-sulfur compound into the pyrolysis furnace coil because Stein generally discloses thermal treatment and it would be appropriate to heat the phosphorous-sulfur compound to any temperature effective for fouling inhibition. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a method wherein the phosphorous-sulfur compound is heated in an oxygen and water-free atmosphere because this allows for more control and stability in the thermal reaction zone. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a method wherein heat-treated phosphorous-sulfur compound is injected into the pyrolysis furnace from about 20 minutes to about 24 hours prior to processing the hydrocarbon feedstock or a method wherein

heat-treated phosphorous-sulfur compounds are injected into the pyrolysis furnace simultaneously with hydrocarbon feedstock because the phosphorous-sulfur compound must be injected prior to or contemporaneously with the hydrocarbon feedstock in order to fully utilize its antifouling properties. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a natural gas carrier because natural gas is a hydrocarbon as is the feedstock.

Response to Arguments

Applicant's arguments have been fully considered but are deemed unpersuasive. Applicant asserts that a significant reduction in both coke accumulation and coking rate is observed with a thermally treated phosphorous-sulfur compound while a marginal reduction is seen with non-thermally treated phosphorous-sulfur compound and that Stein does not disclose any heating temperatures or heating times. Applicant's Table 1 in Example 7 of the specification only shows coke inhibition with thermally treated phosphorous-sulfur compound and does not show the results of non-thermally treated phosphorous compound as compared to no coke inhibitor and therefore applicant's results cannot be fully analyzed. Furthermore, applicant does not show any distinct advantage by utilizing his claimed temperature and times for heating the phosphorous-sulfur compound. Therefore, for at least the aforementioned reasons the Examiner maintains that applicant's invention would have been obvious to one having ordinary skill in the art at the time the invention was made.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Arnold, Jr. whose telephone number is 571-272-1443. The

examiner can normally be reached on Monday-Thursday 8:30 AM-6:00 PM; Fridays from 8:30 AM-5:00 PM with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0651.

ja
December 18, 2003

Walter D. Griffin
Primary Examiner